Slavomír Hanzely

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EDUCATION

King Abdullah University of Science and Technology, 2020-present
Applied Mathematics and Computational Science (Phd. student). I am in the research group focused on the Optimization (Stochastic Optimization, Distributed Optimization, Federated Learning), my supervisor is Peter Richtárik.

King Abdullah University of Science and Technology 2019-2020
Applied Mathematics and Computational Science I am in the research group focused on the optimization (Machine Learning related), my supervisor is Peter Richtárik.
Relevant courses that I passed: Special Topics in Data Sciences, Special Topics in Machine Learning, Special Topics in Federated Learning, Probability and Statistics, Stochastic Processes, Contemporary Topics in Signal Processing.

Faculty of Mathematics, Physics and Informatics, Comenius University, Computer Science (Bsc. degree) 2016-2019
I enrolled excessive amount of courses, only in 1st year I got 95 credits (including master's courses; recommended amount for one year - 60). During my Bsc. study, I passed 7 Master courses[1] and I unofficially attended (due to the high amount of credits) 8 courses[2]:
Passed all Bsc. finals with best grades.

Gymnázium Jána Adama Raymana, Prešov (high school) 2013-2016
Graduation (Maturita) in 6 subjects (only 4 are compulsory), passed with best grades

LAST PROJECTS

Lower Bounds and Optimal Algorithms for Personalized Federated Learning — accepted to NeuRIPS 2020, arXiv link
We establish first lower bounds for personalized FL formulation, for both the communication complexity and the local oracle complexity. We also propose several methods matching these lower bounds in almost all regimes (hence provably optimal). As a consequence, we are the first to show the optimality of local gradient methods for a problems with heterogeneous data. We demonstrate the practical superiority of our methods through extensive numerical experiments.

Adaptive Learning of the Optimal Mini-Batch Size of SGD — accepted to NeuRIPS 2020 workshop, arXiv preprint 2005.0109.
In this project, we investigate usability of the theoretical formula for the optimal minibatch size of SGD (minimizing the number of effective data passes) from [Gower et al., 2019]. We design a practical SGD method that is provably learning the optimal batch size adaptively throughout its iterations and experimentally confirm its behaviour. Further, we generalize our method to several new batch strategies not considered in the literature before, including a sampling suitable for distributed implementations.

[1] Cryptology, Programming Languages, Probabilistic Methods, Advanced Effective Algorithms, Mathematical Analysis(3), Unstructured Talks on Structures: Chapters in Mathematics for Computer Scientist(1, 2)

[2] Category Theory, Graph Theory, Combinatorial Structures, Markov Processes, Probability Theory, Selected Topics in Data Structures, Selected Topics in Algebra, Matrix Calculus

Random sampling from uniform distribution on multidimensional polyhedra (Bachelor thesis, supervisor: Radoslav Harman) 2018/2019, link here.
We provide a survey of existing algorithms for generating from uniform distribution on a polyhedron and test them numerically.

ACHIEVEMENTS

Vojtěch Jarník Competition

2017: **8-10th place** in category 1 (first place within Czech and Slovak contestants)

Mathematical Olympiad

2016: **3rd place** on the national round, category A (winner)
Participation on **International Mathematical Olympiad** (IMO)
1st place on regional round, category A

2015: 18-20th place (**bronze medal**) on Middle European Mathematical Olympiad (MEMO)

2014: 1st place on regional round, category B

2013: 1st place on regional round, category C
Participation on Czech-Polish-Slovak match junior (CPSJ) - 3rd place within Slovak contestants

Olympiad in Computer Science

2016: 1st place on regional round, category A

2015: 2nd place on regional round, category B

WORK EXPERIENCES

Nozdormu (crypto trading company) - internship Jun 2020 - Aug 2020
Main goal was to analyze, model and design practical algorithms to optimize resource allocation of the company and implement the developed methods under various constraints.

Mathematical Olympiad 2017 - 2019

- marking problems at the national round of Mathematical Olympiad (3 times)
- organizing a day at the national selection camp for International Mathematical Olympiad — creating problem set and marking the solutions (3 times)
- preparing new format of selection camp for International Mathematical Olympiad and creating problem sets for the whole camp (team of 4 people)

Trojsten — volunteering 2016-2019

- marking solutions of the competitions for talented high school students KMS, KSP and iKS (approximately 600 solutions, 150 hours of work)
- organizing camps for talented high school students in Mathematics and Computer Science - up to this day, I have organized 11 camps (4 of them as the main organizer).
- delivering 36 lectures (including a half-day lecture on the camp iKS)

SKILLS

Programming

- advanced in Python, PyTorch, Julia, Java , C/C++
- experiences with Matlab, R, Haskell, Assembler

HOBBIES

Sport

- ultimate frisbee
  participation on European Youth ultimate Championship - Slovak national team
  participation on European Youth ultimate Cup - Slovak national team
- in past: ice-hockey, floorball, karate